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Solar Water Pumping System: A sustainable way to reduce electricity cost in Okushibri

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Abstract

This research focused on a sustainable solar water pumping system to help Okushibri community in Tema, Ghana reduce the electricity cost of the current system. We examined and compared sustainable solutions using renewable energy. After analyzing data related to the community from HOCAP, we find that a solar water pump can fulfill this mission.

Background

Okushibri community:

- Location: Tema, Ghana, Africa
- Population: 500-550
- Water demand: 500 gallons/day
- Total electricity Cost: 10–20 $/month
- Annual solar radiation: 5.0 - 5.5 kWh/m^2/day

Home of Care and Protection (HOCAP) and Seven Hills Global Outreach (SHGO) helped the community build an electric pumping system to provide the community with clean water for drinking, irrigation, sanitation, and hygiene. However, the electricity cost of the system is so high for HOCAP who pays the bill that HOCAP is now facing a budget limitation. (SHGO, e-mail March 28, 2013)

Solution

Solar water pump
Average Product Cost: $2000
Rate: over 600 gallons/day or 54 gallons /hour

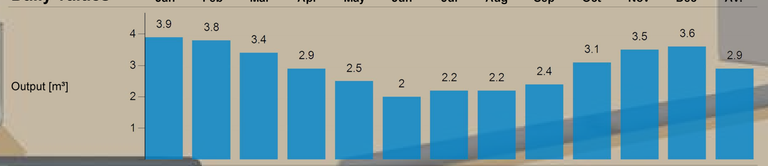
Sample product from LORENTZ, a market leader in solar powered water pumping solutions. Lorentz also has International distributor in Accra, Ghana.

PUMPTECH, e-mail April 16, 2013

Products	Quantity	Details
PS200 HR-07	1 pc.	Submersible pump system including controller, motor and pump end
LC75-12M	2 pc.	150 Wp; 2 x 1 modules; 15 ° tilted
Motor cable	35 m	4 mm² 3-phase cable

Daily output in average month 2.9 m³

Daily values



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Energy [kWh]	0.74	0.72	0.69	0.65	0.58	0.52	0.54	0.54	0.57	0.65	0.69	0.71	0.63
Irradiation [kWh/m²]	5.8	5.7	5.4	5.1	4.6	4.0	4.2	4.2	4.4	5.1	5.4	5.6	5.0
Rainfall [mm]	0.57	1.4	3.2	4.1	5.5	7.4	3.3	1.9	3.3	4.5	2.4	1.0	3.2
Ambient temp. [°C]	26	26	26	26	26	25	24	24	24	25	26	26	25

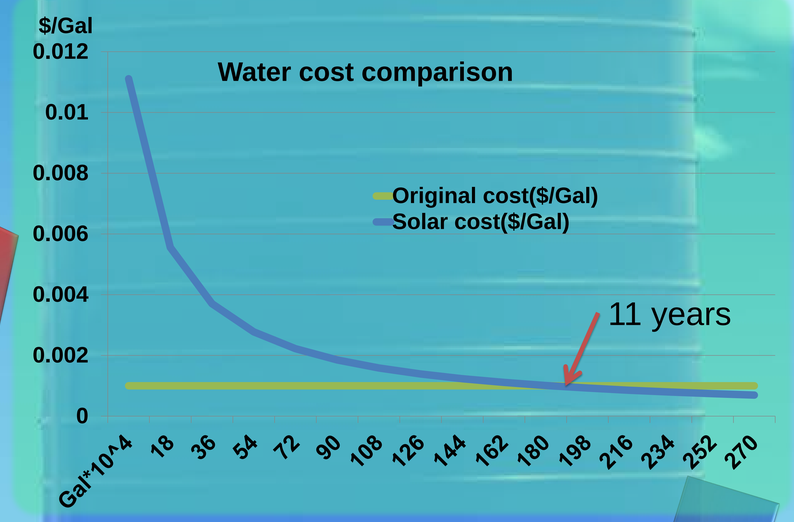
Methodology

Data analysis:

- Water supply VS. demand
- Energy supply VS. demand
- Current cost VS. reduced cost

Case study

- Similar solar water pump projects



Implementation options

Donation of a water pump
- Advertisement
- Okushibri as a pilot, then develop a win-win partnership with HOCAP

Installment payment
- Reduce the initial high cost
- Money saved for monthly payment

Conclusions

A solar water pumping system is sustainable and plausible. This new system not only can be used in the Okushibri community, but also other similar communities who are still struggling with the lack of clean water.

Acknowledgement

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References

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